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Use of principal component analysis for identification of temporal and spatial patterns in the dynamics of ionospheric equatorial anomaly

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Abstract

© Published under licence by IOP Publishing Ltd. In this paper we describe results of the principal components analysis of the dynamics of Total Electronic Content (TEC) data with the use of global maps presented by the Jet Propulsion Laboratory (NASA, USA) for the period of 2007-2011. We show that the result of the decomposition in principal components essentially depends on the method used for preprocessing the data, their representation (the used coordinate system), and the data centering technique (e.g., daily and seasonal components extracting). The use of momentarily co-moving frame of reference and other special techniques provide opportunity for the detailed analysis of the ionospheric equatorial anomaly. The covariance matrix of decomposition was calculated using Spearman's rank correlation coefficient that allows reducing statistical relationship between principal components.

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